# Benefits of Embedded Web Technology in the Design Process

## Topics in Engineering 5
## New Design Paradigms

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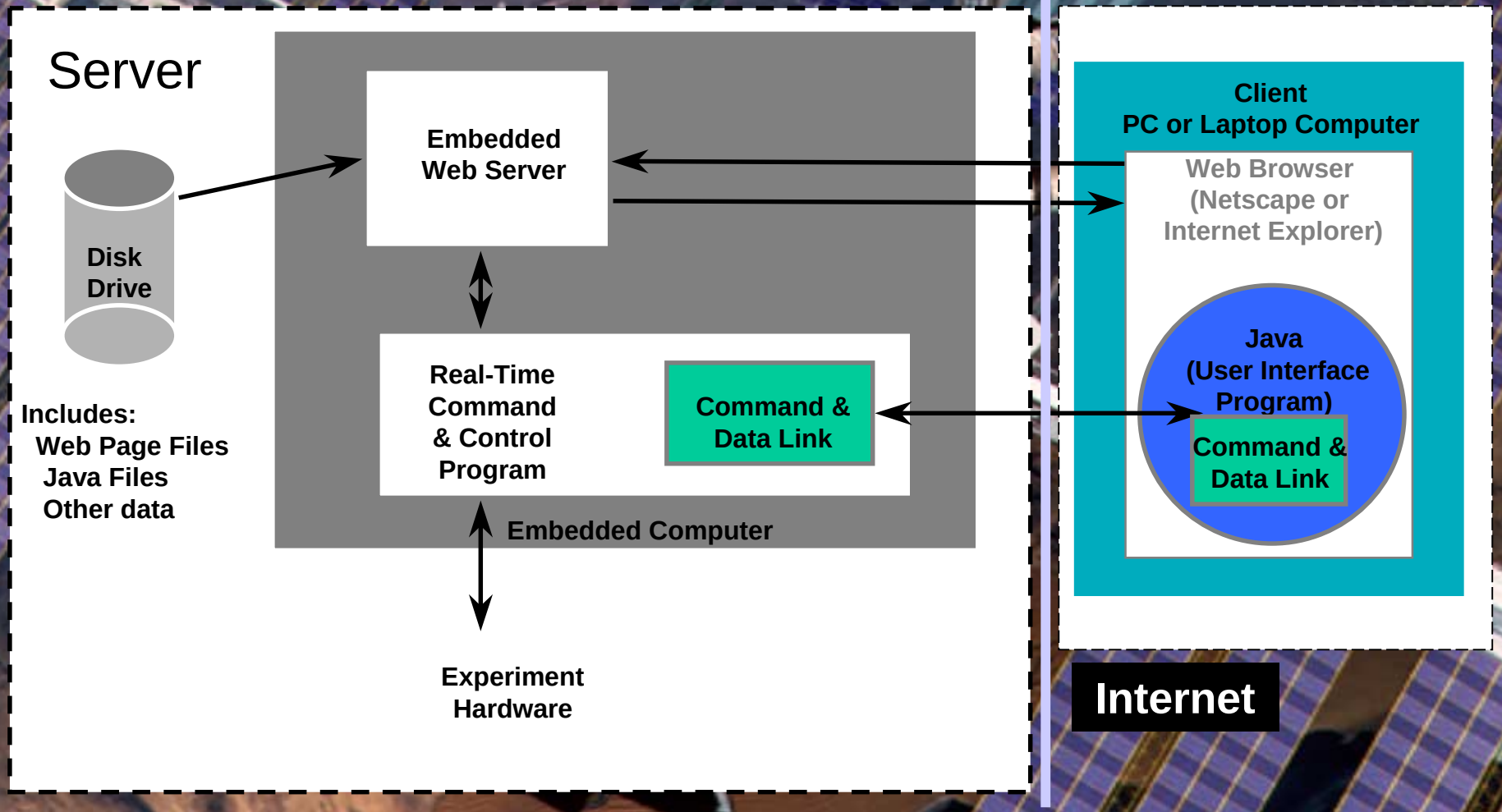
# Embedded Web Technology

**What is Embedded Web Technology (EWT)?**

- The application of WWW standards and technologies to embedded systems
  - An embedded system is defined as a system that utilizes at least one computer as an integral part

# Embedded Web Technology

## Block diagram



# Embedded Web Technology

**Key WWW Technologies used in EWT**

- HTTP (Hypertext Transfer Protocol) and HTML (Hypertext Markup Language) – allows system user to utilize a web browser to interface to the system from the internet/intranet
- Java – allows the user interface SW to be platform independent
- CORBA/IIOP – allows all of the computers to communicate in platform/language/OS neutral manner
- EWT is not limited to these three technologies
  - Other candidate technologies include VRML, XML, Audio, Video

# Embedded Web Technology

**Overall Benefits of EWT in the Design Process**

- Allows for an embedded system to be developed using commercial, non-proprietary WWW standards
  - Leverage the work of others who developed standards
- Embedded system becomes a node on the WWW
- No need for custom user interface hardware
- User interface software runs in a web browser
- User interface software is platform independent
- Developers utilize tested technology and standards
- Eliminates the need to develop custom protocols/standards
- True COTS SW can be utilized

# Embedded Web Technology

**Overall Benefits of EWT**

- Easier to find new personnel familiar with the technologies
- Commercial training available for the technologies
  - Project specific training still needed
- Reduced amount of software to maintain
- Security can be implemented in layers
- Reduced costs in all phases
  - Mass marketed COTS products keep prices low
  - Fewer documentation requirements

# Embedded Web Technology

**Benefits of EWT in the Design Process**

- Requirements Phase
  - Reduces the number of requirements needed to define interfaces
    - “Reinventing the wheel” gets reduced
    - Example: IIOP defines an interoperable ethernet communications standard. No need to re-specify a project unique protocol.
  - Using commercial standards reduces the amount of documentation to be generated
    - Refer to the publicly available specifications

# Embedded Web Technology

**Benefits of EWT in the Design Process**

- Prototyping
  - Opens a project up to more COTS products
  - Prototyping of the system needs to be done to evaluate COTS products
    - Does the product live up to expectations?
    - Does it do what the system needs?
    - Which product is the best for the system?
    - Other COTS considerations apply
  - Higher fidelity prototyping can be done
    - Allows for earlier validation of requirements
  - Easier for users to access prototypes and evaluate the system early

# Embedded Web Technology

**Benefits of EWT in the Design Process**

- Design Phase
  - Reduces the amount of design work
    - Result of using public standards
  - More time to concentrate on the project's needs
    - Example: IIOP eliminates the time that would be spent on defining a communication protocol
    - Java eliminates the problem of designing to a specific platform

# Embedded Web Technology

**Benefits of EWT in the Design Process**

- Testing
  - Can reduce the amount of testing to be done, provided a COTS product is being used
    - COTS web servers and CORBA tools
  - Allows for high-fidelity simulators to be quickly built and perform early testing
  - Allows for monitoring the embedded system via the web browser

# Embedded Web Technology

**Benefits of EWT in the Design Process**

- Implementation and Maintenance/Sustainment
  - Easier to upgrade the system
    - User's computer can be changed without impacting the embedded system
  - Higher degree of reliability
  - Training simplified
    - All applications utilize a web browser
  - Fewer custom requirements, design and code to maintain
  - Easier to find personnel familiar with the technology

# Embedded Web Technology

**Downside of COTS with EWT**

- If a COTS product is practical to use then the system is dependent on a vendor to provide fixes – may not be timely
- Vendor may go out of business
- Vendor may upgrade the product – do you?
- Dependent on vendor for support
- How much excess baggage does the COTS have?
- Product line may be dropped by the vendor
- Technology is constantly changing – is what you selected going to be obsolete soon?
- Need to allocate time to evaluate and select products and standards
- Need to be check for browser upgrade compatibility

# Embedded Web Technology

**Other Considerations with EWT**

- Do the standards/protocols/COTS products fit your system?
- Is it cheaper to buy than to develop, if you can buy?
  - WWW standards are not typically geared towards embedded systems
- Testing still needs to be done
  - Does the product live up to its advertised capabilities?
  - Does it do what I need?
  - Will the product integrate with the rest of the system?
  - How much effort is required to install it?
- Appropriate security level needs to be determined
  - Password/ID, SSL, VPN, biometric device